

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Carrier Current Systems, including)	ET Docket No. 03-104
Broadband Over Power Line Systems)	
)	
Amendment of Part 15 Regarding)	ET Docket No. 04-37
New Requirements and Measurement)	
Guidelines for Access Broadband)	
Over Power Line Systems)	

REPLY OF CORTLAND E. RICHMOND, JR.

TO

COMMENTS OF Progress Energy Corporation

These Reply Comments are filed in response to comments in the referenced matter by Progress Energy Corporation, hereafter referred to as "Progress." The writer has been employed in the field of Radio Frequency Interference and Electromagnetic Compatibility in diverse technologies since 1983, has held an Amateur Radio license over 40 years, and spent more than 21 years in the Army working with and on communications systems and electronic equipment.

Original and Reply Comments appear on following pages. Additionally, a Reply is included in this document to the EMC test report Progress enclosed in its Comment.

Progress Energy comments, with replies:

Progress writes:

Comment: As the proposed measurements are to be performed in-situ, the measurements should be performed with the Access BPL equipment power levels set for normal operations at that site – not at the maximum power levels as proposed in the NPRM. In normal operations it is quite likely that the Access BPL equipment would operate at a power level much less than the maximum it is capable of generating. Therefore, measuring at the maximum power levels would provide an inaccurate reading for the Access BPL equipment operating at that site.

Reply:

The Commission appropriately specifies maximum power as the level at which a part 15 device or system must be measured. There would be little objection to Progress' approach if power levels were restricted everywhere to the level at which they wish to test, but that is by design not the case. A test meant to secure compliance everywhere must take account of conditions elsewhere.

Progress writes:

Comment: We suggest the testing be performed when transferring data at a sustained rate that would be similar to slightly greater than the expected usage rate at that site. Performing the EUT with the maximum RF duty cycle it is capable of generating may not represent the normal operation of the equipment with a maximum sustained data transfer. We interpreted the intent of this requirement as being to exercise the equipment so that it would exhibit its maximum potential for creating interference – under normal operating conditions. However, there may be a way to cause the equipment to operate in a diagnostic test mode (used for development testing only) so that its maximum RF injection duty factor would far exceed the RF injection duty factor as would be seen in normal operations, even with a maximum sustained data transfer. This could possibly generate far more interference than would ever be seen in normal operations. By using a sustained data transfer to test the Access BPL equipment so that it will exhibit its maximum RF injector duty factor as would be seen in normal operations will allow a more accurate way of testing the Access BPL equipment.

Reply:

The Commission prudently, and consistently with other Part 15 device tests, requires the maximum operational capability of BPL equipment be exercised during tests. Progress seems to object to this based on to the possibility that equipment could be commanded to exceed that throughput. If this is so, someone will do it, and it should indeed be tested. However, it is fortuitous Progress has brought this up; Progress, and others, need reminding that they are not in the vault or the transformer yard now, and BPL interference generated as a result of maintenance is not exempt from Part 15.

Progress writes:

Comment: If there are a total of three or fewer installations that satisfy the requirements in this paragraph, then we propose the requirement should be for testing only those installations.

Reply:

It is clear that the Commission intends that there be exactly buildings tested; the purpose of the requirement is to expand the configurations possible and more thoroughly test interference in a variety of situations. The Commission is being sympathetic to those who have to actually perform the tests; one could easily justify enlarging the number of installations and types of installations to be tested.

reflection prompted by Progress' comment, leads writer to recommend that at least one steel framed building – steel frames are efficient antennas for coupled power line noise and ground return noise on inter-building MV power is unavoidable – be included in the configurations tested, if service is provided into such. Access systems operating in the urban power line environment will pass close to thousands of radio users and will in this environment substantially blur any distinctions between Access and Home BPL for EMI purposes.

Progress writes:

Comment: We agree with the analysis in the upper section of Paragraph 37 (Page 16) of the NPRM and therefore see no need for additional measures. In general, we believe that the risk of harmful interference from Access BPL operations is low. We also believe that a properly designed and operated Access BPL system will pose little interference hazard to non-amateur services such as aeronautical, maritime and public safety. Should any potential harmful interference with any state-wide communication system become apparent then it should be handled like any other report of harmful interference.

Reply:

Progress' belief has by now been demonstrated incorrect. BPL-generated harmful interference to radio reception has been documented on streets and in homes, and to varied radio services, including government Time and Frequency broadcasts. Moreover, Progress' reference to a putative "state-wide" communication system is puzzling. Does Progress believe itself free to interfere with merely city or county-wide communications systems? Nationally? Internationally? The Radio Treaty mandates that all be protected, which protection is the reason for having Part 15 of the Rules to begin with.

Given Progress' record with interference complaints caused by its relatively tiny deployment, it is not reassuring that they intend to handle statewide communications "like any other report of harmful interference." Judging by its own statements (which

appear later here) with regard to interference from field trials now taking place, Progress apparently has decided that Part 15 does not apply to mobile or portable radio reception. This may come as an unpleasant surprise to mobile radio users who depend on their radios for safety communications, for making a living, and for entertainment and communications.

Progress writes:

Comments: We propose that any shut-down capability be manually controlled. We feel that any automated system could potentially disable a normally operating system inappropriately. Such disruptions could have serious detrimental impacts on utility operations, such as meter reading and outage detection, as well as, unreasonably interfere with broadband users relying upon BPL. In addition, any reported harmful interference complaint should be investigated to determine first, whether or not it is related to the Access BPL system, and whether the interference is truly harmful.

Reply:

Progress is putting the cart before the horse. Shutting down is an appropriate response to detection of licensed activity for a Part 15 device, if not for reading meters and detecting outages. BPL is simply unsuitable for what they want to do; they might just as well use Citizens Band radios. BPL could be inexpensive but cheap tools are one of the most costly purchases one can make.

Progress' approach to interference is not conducive to resolving complaints. It is, however, conducive to evading responsibility. This seems endemic to power utilities – FCC enforcement letters reported by the ARRL include many chiding power utilities for inaction. BPL looks like more of the same: “What interference?” “It isn't us!” and (Progress' invention) “That's not really harmful.” When added to “We can't do anything until Sam comes back,” and “Purchasing hasn't approved the contract,” delay could run for years. And that's just wrong.

Progress writes:

Comments: Once a system has been installed and is operating within the limits and requirements in place when it was installed, that system should be allowed to remain in operation as long as it remains in compliance with the original requirements in place when it was first installed.

Reply:

Grandfathering has been appropriate where it would do no harm. Existing requirements have already been shown inadequate to protect HF radio reception from BPL, as BPL is now implemented. Should BPL improve, or Part 15 requirements become more stringent, grandfathering would obviate the advance. Moreover, given Commission consideration

of “interference temperature” as an approach to interference, grandfathering could become actually harmful. For these reasons, the writer recommends that the Commission not consider grandfathering existing BPL installations.

Progress writes:

Comments: Progress Energy believes that a centralized database (accessible by the public and/or our competitors) is not necessary and not appropriate. The unintended effects of establishing a centralized database would be to allow access to proprietary information by entities that either do not need it, would want it for competitive reasons, or to facilitate specious harmful interference complaints. We are not aware of any other requirements to publish information about other unlicensed radiation sources that conform to FCC Part 15 Rules. Why should BPL be any different? We feel that each Access BPL operator should maintain a database of its own Access BPL system. The information contained in this database should be based upon zip codes, which is consistent with existing reporting requirements for broadband providers. This database should remain private and should not be centralized or maintained by an industry operated entity. This database should not be shared or made public as it will contain proprietary information that could and would likely cause harm to the business operations of the operating entity by allowing inappropriate information to become available to their competitors. Any reported interference complaints should be reported to the operating entity. The operating entity would then be able to utilize this internal database to evaluate the likelihood of the reported interference being related to any Access BPL system and take appropriate actions as necessary.

Reply:

Progress is explaining what it does not want to do. Progress has already deemed “specious” documented reports of harmful interference, redefining Part 15 and Part 2 to suit its argument. Here, Progress defines complaints as specious in advance. A secret database, as Progress recommends, maintained by an industry group, as Progress suggests, is an exercise in bureaucratic futility. A radio user who had read some of the Commission letters referred to earlier might easily conclude that Progress is willing to go along with the exercise so as to avoid actually complying with Part 15's non-interference requirement, or to put off doing so. And so should the Commission.

BPL differs from previous Part 15 emitters in spectrum occupancy and physical ubiquity. These are what requires public disclosure of the frequencies affected and where, in order to prevent a flood of unrelated complaints. The database must be public because most short wave radio listeners, and many radio system users, are not technically competent to track down and identify interference sources themselves.

Progress writes:

As Progress Energy continues Phase 2 of its BPL pilot, we have received several complaints of alleged "harmful interference" from amateur radio operators ('hams'). The term "harmful interference" is defined in the FCC's rules as interference that seriously degrades or repeatedly interrupts another user's transmission. With regard to the hams, it appears that they consider any interference to be harmful. It also appears that those that have submitted complaints about Progress Energy's BPL system intentionally seek out interference using very sophisticated and sensitive equipment. This leads to four factors Progress Energy believes the FCC should consider when addressing the issue of "harmful interference". First, the interference should have to occur in the normal course of the complainant's operations, rather than be the result of the complainant seeking out the interference. Secondly, the interference should have to be more than momentary. That is, for example, if driving another 30 yards will virtually eliminate the interference, then it is not harmful. Thirdly, the interference should have to be proven to so greatly interfere with operations such that communications are practically unintelligible. Finally, the sensitivity of the measuring equipment must be standardized.

Reply:

Progress appears offended to have been caught out, first claiming no possibility of harmful interference, and then, when people went to their test area to find it, apparently changing the wording in the Radio Treaty and Parts 2 and 15 of the Rules without benefit of hearings, proceedings, legislative action or treaty negotiations. Progress might equally well redefine harmful interference as absent when the receiver is turned off. The radio listener, unable to hear the desired station quits in disgust, and the jammer claps his hands and claims compliance.

And should the Commission against all logic agree with Progress that Part 15 protection is not afforded mobile or portable users, the precedent thus established will deal a body blow to the utility of wireless devices in this country from which the technology may never recover. It would have an opposite effect from promoting broadband access.

Progress seems, also, to be confusing measuring equipment with radio reception. Even a cheap portable short-wave radio is as sensitive as professional measuring equipment; no "sophisticated" equipment is needed to be interfered with.

Progress Energy's Part 15 Measurements

Progress writes:

As a part of Progress Energy's Phase 2 trial of the BPL wireless technology, a review of the radiated emissions specifically caused by Amperion BPL equipment installed on the Progress Energy electric system in Raleigh, NC was conducted. These tests were intended to verify the compliance of Amperion MV 1000 Griffin and Lynx products with FCC Part 15 Rules. No emissions were detected that were in excess of the limits for intentional radiators specified in FCC Part 15, Section 15.209. A copy of the full report is attached as a part of these comments.

Reply:

As a professional who has worked in EMC test and design for many years, this writer is gratified by the inclusion of Progress' due diligence in its Comment. But having long experience of Part 15 interactions with radios, the writer is disappointed that Progress has confused compliance with Part 15 with the absence of harmful interference. Moreover, as is explained later, this report may indicate an inability to demonstrate Part 15 compliance at all, with the equipment used.

The report enclosed cannot tell the reader if harmful interference will not occur. What it does, based upon the signal levels shown on the instrument, is to strongly suggest such interference **may** occur. The noise floor displayed is about 20 dB above one microvolt, or ten microvolts, a moderately strong signal by HF communications standards and one the instrument used would be just barely able to display. Some confirmation that this is due to instrument noise may be garnered from signals displayed using the biconical dipole antenna, which is not calibrated below 30 MHz and is almost completely ineffective at 2 MHz.

Signals on the spectrum analyzer display must be increased by the antenna factor of the antenna in use. The FSH3 can accept antenna factors and do this automatically, but from the displays shown, this was not done. For the loop antenna used, the display change would be (over the Amateur bands below 30 MHz) from about 34 dB (a factor of 500) to about minus 16 dB (about one-sixth) at the loop's resonant frequency, and then upwards again until at 30 MHz the loop antenna factor is about 23 dB, a multiplying factor of fifteen over the readings shown.

Succinctly, except between 10 and 15 MHz, results must be increased over the displayed value by 10 dB (three times), usually more, and in some cases, MUCH more. The noise level shown at 2 MHz, the top end of the Amateur 160meter band, is in excess of 20 dB above one microvolt (ten microvolts), and with a 34 dB antenna factor, means that at 2 MHz, no signals weaker than 54 dB microvolts per meter, or 500 microvolts are discernable.

Only near the antenna's resonant frequency is this situation reversed, where the measurement system shown is capable of detecting signals on the order of one microvolt,

but by the time one gets to 15 MHz again the noise floor is at some 30 dB above a microvolt, or over 30 microvolts, which is a strong short-wave signal. No WEAKER ones may be seen, at the bandwidth employed, than the noise level shown.

Part 15 says:

Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in § 15.205, § 15.209, § 15.221, § 15.223, or § 15.227, as appropriate.

The limit of 15.209 between 1.705 and 30 MHz is 30 dB over one microvolt per meter, at 30 meters distance. Progress' measurements were done at 10 meters, where the extrapolated limit would be 40 dB above one microvolt. The measurement setup shown is therefore, due to noise level, unable to detect any signals below the Part 15 limit when the antenna factor is 20 dB or higher, in this case, below about 6.5 MHz and above about 25 MHz. (See curve at http://www.ahsystems.com/catalog/data/AF_SAS-563B.html). It appears Progress has not demonstrated Part 15 compliance, let alone the absence of harmful interference.

Note as well that Progress' Comment does not state the distance at which its loop antenna factor used was measured, but the antenna manufacturer's Web page states that the antenna factor provided for the SAS-563B is for a distance of 1 meter.

All this has some relevance to a disconnect between BPL proponent's claims and actual Amateur Radio experience. Most received Amateur signals are lower, and often much lower, than Part 15 levels. Due to limitations of their instrumentation, BPL proponents see no signals and conclude there are none. This misapprehension should be corrected.

It also confirms that Part 15 limits are quite unable to offer protection from harmful interference in the HF spectrum.

Measurements done with a biconical dipole are unfortunately in even worse state. This antenna is provided with antenna factors for 20 MHz and above. The antenna factor at 20 MHz is about 17 dB, meaning readings must be multiplied by more than 6. It is not designed for, nor calibrated at lower frequencies, where it is an ineffective electric-field antenna. The screens shown do, however give a good indication of the minimum detectable signal.

Conclusion:

For reasons explained in Reply above, the writer asks that the Commission not accede to Progress Energy's (and others') requests with regard to deployment of BPL systems, but instead hold the extant proceeding for further consideration until a more satisfactory and reliable remediation of the problems so far identified has been devised .

Respectfully submitted,

Cortland E Richmond (Jr.)

22 June 2004